Remarks

Claims 1 and 4-24 are pending in this application. Claim 23 has been amended to clarify the invention.

Claim Objection

Claim 23 is objected to because of the following informalities: claim 23 should be dependent on claim 21 instead of claim 17.

Applicant gratefully acknowledges the Examiner's suggestion. However, Applicant believes that Claim 23 should actually be dependent from Claim 16. Claims 23 and 24 are similar, and recite the salient feature of nematic alignment in two types of PDLC morphology: discrete droplets (Claim 16) and interconnected regions (Claim 17). Applicant respectfully requests reconsideration and withdrawal of the present objection.

Rejection of claims 1 and 14 under 35 USC § 112, first paragraph

Claims 1 and 14 are rejected under 35 USC § 112, first paragraph. Claims 4-13 and 15-24 are also rejected since they are dependent on claims 1 and 14.

The Examiner contends that "The claim(s) contains subject matter which was not described in the specification ... The specification does not describe 'a non-chiral nematic liquid crystal' recited in claims 1 and 14; the specification only describes 'a nematic liquid crystal.'"

Applicant respectfully traverses this rejection of Claims 1 and 14 (as well as the claims dependent therefrom). A nematic liquid crystal is non-chiral by definition [see, for example, Peter J. Collings and Jay S. Patel, Handbook of Liquid Crystal Research (Oxford University Press, NY, 1997) Chapter 1, page 7]. As stated in the reference, "If a rod-like molecule is chiral, then it forms the chiral nematic phase instead of the nematic phase ..." "Although it can form some nonchiral smectic phases, it cannot form the nematic or smectic C phases." Hence, one skilled in the art appreciates that all nematics are non-chiral.

Applicant respectfully requests reconsideration and withdrawal of the present rejection.

Rejection of claims 1, 4-6 and 14-17 under 35 USC § 103(a)

Claims 1, 4-6 and 14-17 are rejected under 35 USC § 103(a) as being unpatentable over Kondo *et al.* (5,625,473) in view of Obikawa *et al.* (5,200,110). Applicant respectfully disagrees.

The Examiner states that "Kondo discloses a method of fabricating a diffractive or non-dispersive polymer dispersed liquid crystal electrooptic device ..." The Examiner goes on to recite the elements of Applicant's claimed invention (specifically referring to claims 1 & 14) and contends that these elements are taught by Kondo *et al.* except for providing a nematic liquid crystal in the form of an eutectic mixture.

Kondo *et al.* disclose a method for producing a liquid crystal display device that includes the steps of attaching a first substrate having a counter electrode to a second substrate; injecting a mixture including a liquid crystal and photocurable resin into a gap that is between the counter electrode and pixel electrodes; and irradiating light to the mixture. However, there are significant differences between what is taught by Kondo and the presently claimed invention even beyond the lack of providing a nematic liquid crystal in the form of an eutectic mixture.

In order to establish a *prima facie* case of obviousness, "there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references) must teach or suggest all of the claim limitations." M.P.E.P. §2143, see also, *In re* Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

As mentioned above, there are significant differences between what is taught by Kondo *et al.* and that presently claimed even beyond the differences stated by the Examiner.

The Examiner contends that Kondo **14:34-38** and **20:4-8** teaches that non-chiral nematics can be used to make the devices described in US 5,625,473. This leads to a significant error. For example, it mentions that nematics may be used, however, it is taken from a paragraph that starts at line 25, which begins, "As the liquid crystal material used in the present invention, the following can be used *in addition* to the material described above" (emphasis added). What is the material "described above?" - the material is chiral [Kondo **12:2**]. Regarding Kondo **20:4-8**, this excerpt is taken from a section entitled "Liquid Crystal Material," that begins in column 19, line 49. In this section, Kondo lists the constituents of a preferred mixture, including a two-frequency drive liquid crystal [Kondo **19:52-53**]; a nematic with chiral dopant [Kondo **19:53-54**]; a liquid crystal having a polymerizable functional group [Kondo **19:63-64**]; and "a nematic liquid crystal material with no chiral dopant added and a nematic liquid crystal with chiral dopant added can be used" [Kondo **20:5-7**]. Clearly, the preferred mixture of Kondo contains several chemical entities that are not specified or required by the presently claimed invention, and that would be detrimental to the devices in the presently claimed invention. For example, note that the preferred mixture of Kondo contains both chiral and non-chiral nematics; however, by mixing the non-chiral nematics with the chiral ones, produces an overall chiral nematic [Peter J. Collings and Jay S. Patel, Handbook of Liquid Crystal Research (Oxford University Press, NY, 1997) Chapter 2, page 28].

Referring to Claims 1 and 14, the Examiner contends that "providing a cell comprising a pair of spaced apart transparent substrates that are each coated with a transparent conductive layer without the inclusion of an alignment layer for aligning said nematic liquid crystal" is covered by Kondo **9:6-25**. This contention lacks support because Kondo utilizes a black mask material inside and integral to the cell [**9:10-11**, **9:20-25**, and Fig. 8] thereby, pixellating the display into opaque and transparent regions. Thus, Kondo's devices are inherently lossy. By way of example, if the lateral dimension of the pixels in Kondo is 125 mm [**16:42-44**] and the pixels are on a 250 mm pitch, the maximum transmittance of the Kondo display is 25%. In contrast, the presently claimed invention is directed toward an electrooptic device that is not pixellated, but rather, has an active area that can span millimeters to centimeters – enough to pass a collimated optical beam in its entirety. As a consequence of there being no opaque areas in the photo-cured parts of the devices

made in accordance with the presently claimed invention, the transmittance demonstrated by devices of the claimed invention is >90% (see Figs. 2, 4, 8, 9).

The Examiner further contends that "providing a photo-curable pre-polymer mixture" is covered by Kondo **19:25-47**. As stated previously (in response to an earlier office action), Kondo teaches the use of a specific multifunctional resin, R-684 [**19:35**], while the presently claimed invention employs a different photo-curable material, namely PN393. In addition, the liquid crystal material used in Kondo contains a photo-curable liquid crystal component [**19:62-66**], which runs contrary to the presently claimed invention.

The Examiner further contends that "mixing said nematic liquid crystal with said photo-curable pre-polymer mixture to form a homogeneous nematic/pre-polymer mixture with said nematic liquid crystal being greater than 40% (by weight) of said combined homogeneous mixture" is covered by Kondo **9:26-33** and **20:29-42**. Applicant respectfully disagrees. Kondo **9:26-33** teaches that the nematic is to be mixed with 0.3% of chiral dopant S-811 [**9:30**] thereby transforming the nematic to a cholesteric liquid crystal [see, for example, Peter J. Collings and Jay S. Patel, Handbook of Liquid Crystal Research (Oxford University Press, NY, 1997) Chapter 2, page 28] - the presently claimed invention is directed to a nematic phase liquid crystal. Kondo **20:29-42** is not relevant in light of the teaching in **19:62-66** where the photo-curable components include a photo-curable nematic. The presently claimed invention does NOT utilize a photo-curable nematic liquid crystal.

The Examiner contends that "providing a cell comprising a pair of spaced apart transparent substrates 34, 36 that are each coated with a transparent conductive layer 33, 35 without the inclusion of an alignment layer for aligning said nematic liquid crystal as shown in Figure 8" is covered by Kondo **9:6-25**. Applicant respectfully disagrees. The Examiner's contention is unsupportable because Kondo utilizes a black mask material inside and integral to the cell [**9:10-11**, **9:20-25**, and Fig. 8] thereby pixellating the display into opaque and transparent regions. Thus, Kondo's devices are inherently lossy. By way of example, if the lateral dimension of the pixels in Kondo is 125 mm [**16:42-44**] and the pixels are on a 250 mm pitch, the maximum transmittance of the Kondo display is 25%. In contrast, the presently claimed invention is directed to an electrooptic device that is not pixellated, but

rather, has an active area that can span millimeters to centimeters – enough to pass a collimated optical beam in its entirety. As a consequence of there being no opaque areas in the photo-cured parts of the devices made in accordance with the presently claimed invention, the transmittance demonstrated by these devices is >90% (see Figs. 2, 4, 8, 9).

The Examiner contends that "filling said cell with said homogeneous nematic/pre-polymer mixture" is covered by Kondo **4:25-33**. The method for filling cells as described in Kondo is by injection [Kondo **4:32**]; in contrast, the PDLC cells of the presently claimed invention are not limited to filling by injection.

The Examiner contends that "photo-curing said nematic/pre-polymer mixture using a spatially inhomogeneous illumination source" is covered by Kondo in **4:34-37**. Kondo allows for a "liquid crystal layer," as described in Kondo **4:35-36**; however, the presently claimed invention excludes liquid crystal layers, as clearly indicated in Figs. 2c and 3.

The Examiner contends that "utilizing the above fabricating method to create said diffractive or non-dispersive electrooptic device in the form of a polymer dispersed liquid crystal (PDLC) exhibiting low scattering loss and high index modulation" is covered by Kondo in **1:25-40, 54-65** and **20:9-28**. Applicant respectfully disagrees. The stated references by the Examiner are actually counter examples and bolster the distinction between Kondo and the presently claimed invention. First, reference to the Japanese Laid-Open Patent Publication cited in **1:55-56** actually discloses how to build a display "so that the transmittance and contrast are low" [**1:63-65**]; whereas, the presently claimed invention is directed to a high contrast, low loss (*i.e.*, high transmittance) PDLC electrooptic device. Further, the presently claimed invention employs what is termed "index modulation" referring specifically to half the difference between the indices of refraction of the liquid-crystal-rich, and polymer-rich regions in the device. In contrast, Kondo teaches another metric, which, specifically, is the difference between the indices of refraction of the bulk liquid crystal and cured polymer [**20:13**]. In the technology of Kondo, it is sufficient to utilize only the bulk nematic indices, rather than indices of regions containing two dissimilar materials that are mixed at the microscopic level [**20:9-16** and **20:17-23**].

The Examiner states that "Kondo discloses a liquid crystal electrooptic device that is basically the same as that recited in claims 1 and 14 except for providing a nematic liquid crystal in the form of a eutectic mixture, wherein said nematic liquid crystal has a positive dielectric anisotropy." A comparison of Kondo and the presently claimed invention demonstrates that this is unsupportable at the most fundamental level. For example, all the independent claims in Kondo describe how a "liquid crystal layer" may be fabricated – see claims 1, 5, 7, 9, and 15 of '473. The descriptive text in Kondo also discusses the formation of a layer of liquid crystal numerous times, and throughout the illustrative examples [*e.g.*, Kondo **2:62**, **4:35-36**, **6:48**, **8:55-56**, **9:2-3**, **10:43-44**, **12:26-27**, **13:3**, **15:51**, **16:64** *etc.*]. Kondo also illustrates such a layer of liquid crystal that extends contiguously between two substrates in Figs. 8, 14, and 19 – *viz.*, in each profile view. In contrast, the devices of the presently claimed invention are true PDLC devices, *i.e.*, a line drawn between the two substrates always passes through polymer material. This is evident in Figs. 2c and 3, as well as in the descriptive text. Referring to Claims 1 and 14, these claims correctly identify a "polymer dispersed liquid crystal."

The Examiner asserts that Kondo discloses a liquid crystal electrooptic device except for providing a nematic liquid crystal in the form of a eutectic mixture, and that Obikawa discloses a nematic liquid crystal in the form of a eutectic mixture.

Applicant agrees with the Examiner's adroit finding that Kondo fails to teach a nematic liquid crystal in the form of a eutectic mixture. Moreover, Obikawa fails to rectify the deficiency found in Kondo. The nematic liquid crystal in the form of a eutectic mixture as presently claimed is not taught by Obikawa. Further, there is no suggestion or motivation in either cited reference to combine Kondo with Obikawa. Still further, there is no reasonable expectation of success even if the two references were combined. Therefore, the combination of references does not defeat the presently claimed invention for lack of novelty nor obviousness.

The Examiner next addresses some of the dependent claims. Applicant contends that the independent claims define allowable subject matter. It is axiomatic in patent law that if an independent claim defines allowable subject matter then the claims depending therefrom

also define allowable subject matter. *In re* Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), and Hartness International, Inc. v. Simplimatic Engineering Co., 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987). Given that the rejected claims depend from base claims and those independent claims define allowable subject matter, then the claims at issue must necessarily define allowable subject matter. The reasons for allowability of the base claims are set forth above. However, the issues raised by the Examiner pertaining to the dependent claims are individually addressed below.

Referring to Claims 4 and 15, the Examiner contends that "said substrates are separated by approximately 5.5 micrometers by spacers having a particle size of 5.5 micrometers" is covered by Kondo in **9:15-20**. Applicant respectfully disagrees, in point of fact, the statement in quotes is not to be found in the teaching of the pending application.

Referring to Claims 5 and 16, the Examiner states that "said PDLC is comprised of a dispersion of discrete droplets containing nematic liquid crystal-rich material in a polymer-rich matrix" is covered by Kondo, Figs. 21-24. Applicant respectfully disagrees. In fact, this comparison emphasizes the vast difference between Kondo and the presently claimed invention in several crucial areas. For example, it is clear from Kondo, Figs. 21-24, that the liquid crystal regions 122, which are the regions where the electro-optic effect is utilized, are comprised of large, micro-sized liquid crystal layers that extend from one substrate to the other [see also Kondo **14:61**]. In contrast, in the devices of the presently claimed invention, the electro-optic effect is made possible by sub-micron-sized regions of liquid crystal that do not extend from one substrate to the other (see Figs. 2c and 3). It is also clear from Kondo that the spurious droplets (141) that do appear are detrimental to the ensuing electro-optic devices, as indicated in Kondo Table 3 (column 18). Note that the optical transmission falls to 33% as the population of these spurious droplets increases, while the devices characterized in the presently claimed invention (Figs. 5 and 6) have transmission above 90%. Clearly, liquid crystal droplets hinder the devices of Kondo, while the presently claimed invention is directed toward very low loss devices comprised of PDLCs with innumerable liquid crystal droplets.

Referring to Claims 6 and 17, the Examiner states that "Kondo discloses that said PDLC is comprised of regions of inter-connected spaces 132 that are filled with nematic liquid crystal-rich material 141 as shown in Figs. 21-24." Applicant respectfully disagrees. For example, the aforementioned regions in Kondo appear in the non-functional areas of the Kondo devices, while these regions constitute the functional areas in the devices of the presently claimed invention. That is, the spaces 132 of Kondo do not contribute to the electro-optic effect in the devices; however, in the presently claimed invention, it is precisely these regions that bring about the electro-optic properties of the devices.

Rejection of claims 7-9, 12, 18-20 and 23 under 35 USC § 103(a)

Claims 7-9, 12, 18-20 and 23 are rejected under 35 USC § 103(a) as being unpatentable over Kondo *et al.* (5,625,473) in view of Obikawa *et al.* (5,200,110) as applied to claims 1, 4-6, and 14-17 and further in view of Sumiyoshi *et al.* (6,278,506). Applicant respectfully disagrees.

The Examiner asserts that "Kondo in view of Obikawa *et al.* discloses a method of fabricating a diffractive or non-dispersive polymer dispersed liquid crystal electrooptic device that is basically the same as that recited in claims 7-9, 12, 13, 18-20, 23, and 24 except for the step of deriving said spatially inhomogeneous illumination source ... from the interference of two coherent optical beams within said cell." As stated in a previously, Kondo does not disclose how to make a diffractive device, but rather, only how to make a "display device" with wide viewing angle. Such a device is not a diffractive device, and Obikawa fails to teach a eutectic nematic liquid crystal as presently claimed. Moreover, Applicant agrees with the Examiner when he states that Kondo fails to teach the "step of deriving said spatially inhomogenous illumination source used to photo-cure the nematic/prepolymer mixture from the interference of two coherent optical beams within said cell."

The Examiner continues with the assertion that the art described by Sumiyoshi *et al.* in Figs. 5A-C and 18 of US Patent 6,278,506 B1, renders the presently claimed invention unpatentable. Applicant respectfully disagrees given, among other issues, the significantly different fabrication methods taught by Sumiyoshi. Specifically, Sumiyoshi applies an

electric field across the cell during exposure [**6:37-38**] and further, mounts the cell on a rotation stage [**6:34-35**] for the purpose of making multiple exposures during the cure. These steps are no doubt advantageous for the devices described by Sumiyoshi, but the same steps would be deleterious for the devices of the presently claimed invention. For example, an applied electric field would rotate the grating vector out of the plane of the cell [see Fig. 2(b) of the pending application], thereby leading to loss during use. The presently claimed invention is directed toward the use of one exposure to photo-cure the PDLC grating structures; multiple exposures would certainly reduce contrast, increase loss, and hence render useless the devices intends to fabricate. Finally, Sumiyoshi teaches photo-curing with laser beams exposing the pre-PDLC material through both substrates, while the presently claimed invention is directed toward exposure through only one substrate. These differences in methods are not trivial, and the use of one or the other leads to very different devices with very different morphologies and operational characteristics.

The Examiner states "it is obvious [in Claims 8 and 19] that the coherent optical beams each have a wavelength in the ultraviolet spectrum for radiating the photo-curable polymer," and yet does not support this assertion. However, since the absorbance bands of photo-initiators can be wider than 100 nm (*e.g.*, IRGACURE-184, –907, or OXE01 from Ciba-Geigy) and extend beyond 400 nm into the visible, it is relevant to specify the wavelengths of operation for the lasers. In fact, Kondo also sees the need to do this [Kondo, claim 13].

The Examiner states that Fig. 18 and **10:15-48** in Sumiyoshi teach how to fabricate an unslanted grating, thereby vitiating Claims 9 and 20 of the pending application. This is an unsupportable contention which is easily seen with the aid of Fig. 1 below. Figure 1A shows the scenario described in Sumiyoshi **10:15-48**, namely, two exposures are made in the cell, one by interfering optical beams with wavevectors k_1 and k_2, and a second by interfering optical beams with wavevectors k_1 and k_3. Figure 1B shows the grating vectors Dk_{12} and Dk_{13}, respectively, that result from these exposures. Note that the grating vectors are slanted, and do not lie in the plane of the cell. Therefore, this fabrication scheme described by Sumiyoshi does not produce unslanted gratings, as he recognizes in **10:43-47**, where he characterizes the gratings as "differently declined."

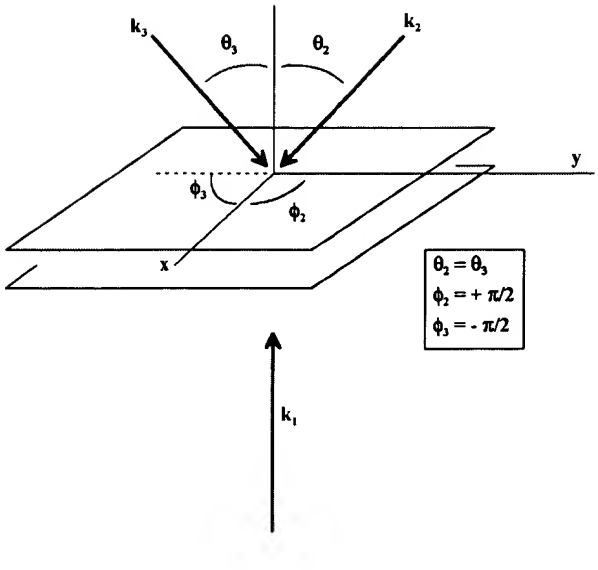

FIGURE 1A. Sumiyoshi describes two PDLC grating exposures in 10:15-48 that are illustrated in this figure. The first grating is formed from the interference between optical waves described by wavevectors k_1 and k_2, while the second grating is formed via the interference between optical waves described by wavevectors k_1 and k_3.

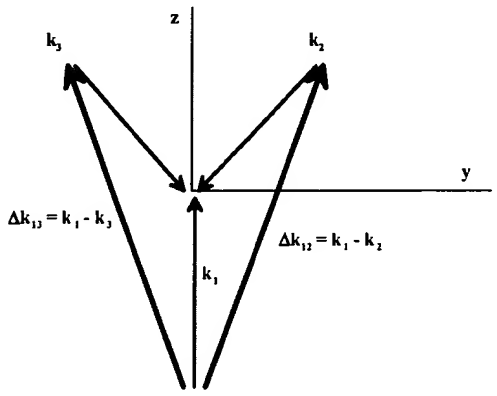

FIGURE 1B. This figure shows the grating vectors that result from the two exposures described in Fig. 1A. These are $Dk_{12} = k_1 - k_2$ and $Dk_{13} = k_1 - k_3$. Note that these vectors have components in the plane of the cell that cancel, leaving only components normal to the substrate surfaces.

The Examiner asserts that Claims 13 and 24 are unpatentable because "Sumiyoshi discloses that the nematic liquid crystal in the nematic-rich regions in the PDLC contains a

high degree of orientational order and has its nematic director substantially aligned along a uniform orientation OR2 in a grating layer 14f when no drive field is applied across said cell," Sumiyoshi **7:17-38**. This assertion is a gross over-simplification. Sumiyoshi *et al.* teach that orientational order "is achieved by applying the potential [an electric field] across the mixture 15a during the laser radiation." In contrast, the presently claimed invention is directed toward a high degree of orientational order which is achieved in the absence of an applied electric field during laser irradiation. Thus, the methods of Sumiyoshi *et al.*, are significantly different than the presently claimed invention.

A case for *prima facie* obviousness has not been established. The cited references either alone or in combination fail to teach each and every element of the presently claimed invention. Further, there is a paucity of motivation to combine these references to arrive at the claimed invention. Still further, there is no reasonable expectation of success should one combine these cited references that the presently claimed invention would be realized through such combinations as suggested by the Examiner.

Rejection of claims 10-12 and 21-23 under 35 USC 103(a)

Claims 10-12 and 21-23 are rejected under 35 USC 103(a) as being unpatentable over Kondo in view of Obikawa and Sumiyoshi as applied to claims 7-9 and 18-20 above and further in view of Popovich.

The Examiner states that Claims 10-12 and 21-23 are unpatentable over Kondo *et al.* in view of Obikawa *et al.* and Sumiyoshi *et al.* "and further in view of Popovich *et al.* (USPN 6,339,486B1)." Applicant respectfully disagrees with the Examiner on the basis of the vast dissimilarities between the fabrication methods taught in Kondo and Sumiyoshi, and further, because the devices of the presently claimed invention perform substantially differently than the devices described in Kondo, Obikawa, Sumiyoshi, and Popovich. Consider specifically the stated objectives of Obikawa, including providing "liquid crystal compositions for electro-optical display devices," and for providing "improved liquid crystal compositions ... for ... lowering the driving voltage" [**3:19-27**]. Nowhere does the presently claimed invention address liquid crystal display devices, nor is there an effort to reduce switching voltage. In fact, as previously stated, the presently claimed invention is directed toward

electrooptic switching devices that require incredibly high switching voltages, wholly unsuitable for electrical driving technologies utilized in conventional liquid crystal displays. Next, consider the significant differences between the fabrication techniques of the presently claimed invention and those of Kondo and Sumiyoshi, as described above. Additionally, consider the significant differences between the performance of the display devices of Kondo and the presently claimed invention. Further, consider that Sumiyoshi does not achieve high contrast, low loss functionality in display devices, which is one of the features of the presently claimed invention. The devices of Sumiyoshi are inherently lossy and low contrast because of the necessary requirement that multiple gratings be written according to his teaching. The reference, Popovich, does not bolster the case made earlier by the Examiner, because the devices taught by Popovich entail multiple pixellated display device layers with special waveplates interspersed between the multiple layers. Thus, the Popovich devices are significantly different than the devices of the presently claimed invention. Also, the PDLC materials utilized by Popovich are much different that the materials used in the presently claimed invention. Specifically, the preferred material in the art of Popovich contains between 20-35% liquid crystal content **[6:40-43]**, while the presently claimed invention is directed toward >40% liquid crystal content, see, for example, Claims 1 and 14.

The Examiner states that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the device of Kondo with the teaching of Popovich by forming the unslanted PDLC transmission grating with a grating period that is greater than half the wavelength of the light to be diffracted by the PDLC transmission grating during use of said transmission grating or a spatial frequency that is sufficiently high to prohibit propagating diffracted orders for normal incident light, thereby creating an electrooptic retarder with electrically tunable birefringence or a retarder so as to improve the display brightness." Applicant respectfully disagrees. Above Applicant demonstrated that Kondo has not described a viable PDLC device, but rather, a display device that contains liquid crystal layers extending contiguously between the two display substrates. Thus, there is no relationship – technically or otherwise – between Kondo (and Popovich) and the presently claimed invention. On the other hand, Popovich does address viable PDLC devices; however, those devices are based on materials with < 40% nematic content. The presently claimed invention is directed toward a low loss, high contrast device

that are possible through using PDLC materials with > 40% nematic content. This constitutes a significant departure from Popovich. The devices of the presently claimed invention posses significant improvements over the teaching in Popovich, including lower loss, higher contrast, higher degree of orientational order, lower switching voltage, and similar switching speed. See, for example, the references cited in columns 4 and 5 in Popovich, which describe substantial switching for both s- and p-polarized optical beams. In contrast, the devices of the presently claimed invention contain highly oriented liquid crystal content, which is manifest in the switching data presented in Fig. 4 of the pending application. There s-polarized light is not switched at all, while p-polarized light is switched, for a wide range of applied electric field. Another example is found in the high-spatial frequency data provided by Popovich **[17:2-11]**. There, Popovich reports a retarder device with maximum birefringence of only Dn = 0.008. In contrast, the presently claimed invention has a high-spatial frequency PDLC device with birefringence Dn = 0.048, a value that is six times larger due to the high degree of liquid crystal orientation in the device. Thus, the art expounded by Popovich is inferior in important optical performance characteristics, due to the limitations imposed by his fabrication methods.

The Examiner states "claims 12 and 23 as shown in Fig. 8, Sumiyoshi discloses that the nematic liquid crystal in the nematic-rich regions in the PDLC contains a high degree of orientational order and has its nematic director substantially aligned along a uniform orientation OR2 in a grating layer 15f when no drive field is applied across said cell **[7:17-38]**." This assertion is essentially the same one raised above and Applicant responded to this argument.

A case for *prima facie* obviousness has not been established. The cited references either alone or in combination fail to teach each and every element of the presently claimed invention. Further, there is a paucity of motivation to combine these references to arrive at the claimed invention. Still further, there is no reasonable expectation of success should one combine these cited references that the presently claimed invention would be realized through such combinations as suggested by the Examiner.

In summary, the Examiner cites many of the same references – Kondo *et al.*, Sumiyoshi *et al.*, Obikawa *et al.*, and Popovich – as in previous Office Actions, using essentially the same arguments. In general: (i) Kondo is not relevant because he is making display devices that contain liquid crystal layers – *i.e.*, contiguous liquid crystal layers that extend between the two substrates, whereas, the presently claimed invention is directed toward PDLC devices are true PDLCs – *i.e.*, a line cannot be drawn between the substrates that does not intersect both liquid crystal-rich and polymer-rich material, because there are no contiguous layers to be found, (ii) Obikawa fails to rectify the deficiencies seen with Knodo as well as the other cited references, (iii) Sumiyoshi is not relevant because he teaches how to make multiple slanted gratings in PDLCs, whereas, the presently claimed invention is directed toward a single unslanted gratings to achieve low loss and high contrast, and (iv) Popovich appears to teaches how to make PDLC devices, however, his materials must contain < 40% nematic content - whereas, among other differences, the presently claimed invention is directed toward materials having > 40% nematic content. This characteristic has important ramifications for device performance. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the present rejections.

In conclusion, in view of the above remarks, Applicant respectfully requests the Examiner to enter this amendment which clearly places the pending claims in condition for allowance over the prior art and issue a Notice of Allowance or, in the alternative, the Examiner should enter this amendment for purposes of appeal. In the event the Examiner has any further questions, as pointed out above, the Examiner is encouraged to call Applicant's attorney at the number provided below.

The Examiner is invited to call the undersigned attorney at (617) 854-4237 should he determine that a telephonic interview would expedite prosecution of this case.

Respectfully submitted,

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Reg. No. 48,921

Date: April 13, 2006